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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

HERVE LESCUYER et al

Group Art Unit: 1723

Serial No.: 09/856,460

Examiner: K. S. Menon

Filed: August 7, 2001

For: IMPROVED METHOD FOR FILTERING A METAL LIQUID
ON A BED OF REFRACTORY PARTICULATE MATERIAL

RESPONSE

Honorable Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

Sir:

The following remarks are submitted in response to
the Office action mailed March 28, 2003.

Claims 1, 2, 4 and 6 have been rejected under 35 USC
103 over Hess et al in view of Rieger et al.

Hess et al has been cited to show a filtration
method for liquid metals in which the liquid metal is passed
through a bed of refractory particulate material. No porosity
is disclosed for the refractory particles.

Rieger et al discloses a filter medium in the form
of a stable porous body of granules of spherical form bonded
together by a different phase or by sintering. The preferred
filter medium is hollow spherical granules of corundum.

The Office action makes the allegation that Rieger et al teaches that the overall density of the filter bed is about 25% of the ceramic material density, meaning that the overall porosity, including the space between the particles and the pores within the particles, is about 75%. Since Rieger et al defines the space between the particles as about 45% by volume, the Office action alleges that the remaining porosity of 30% is space within the particles. Applicants disagree strongly with this conclusion.

Submitted herewith is a Declaration of Pierre Le Brun, an expert in the field of metallurgy and metal casting, in particular molten metal treatment and filtration, employed by the Assignee. Dr. Le Brun points out that while the apparent or actual measure density of the particles is 25% of theoretical, the actual volume of the particles makes up only 55% of the space in the filter bed. Thus, the proper density calculation for the particles alone is 25 divided by 55, or 45.4% of theoretical density. Hence, the volume of empty space within the particles must be 54.55%, which is far greater than the 30% attributed by the Office action to space within the particles.

Moreover, Dr. Le Brun further concludes that the porosity of the plate intended for filtration by Rieger et al is that of the space between the granules and not of the space within the granules. It is his opinion that the space within

the particles is normally not accessible to the liquid metal for filtration and does not significantly enhance the open porosity of the plate.

Since Rieger et al clearly states that solid or hollow particles may be used interchangeably, Dr. Le Brun believes that they do not specifically teach the use of hollow spheres to improve filtration properties, but rather to reduce the weight of the plate and improve its strength.

Thus, there is nothing in Rieger et al which discloses or suggests that the use of hollow particles enhances filtration of liquid metal, or that such pores are open to enhance the filtration. Rather, it would appear that the porosity of such hollow spheres is closed porosity, and not available to enhance the filtration of liquid metal.

Accordingly, Rieger et al does not disclose or suggest using particles with open porosity to improve the filtration properties of particle bed filters such as the filter disclosed by Hess et al, and withdrawal of this rejection is requested.

Claims 3 and 11 have been rejected under 35 USC 103 over Hess et al in view of Rieger et al and further in view of Brezny.

Brezny teaches a method for making porous ceramic beads having a bimodal porosity distribution of micropores in the range of 0.001-1.0 μm and reticulated macropores in the

range of 10-200 μ m. Brezny does mention at column 1, line 7, that porous ceramic material have been used as molten metal filters, among other uses, but states further at column 1, lines 8-11 that "[t]he specific use of a ceramic will depend on the size of the porous ceramic body, the nature of the porosity (closed or open), and ceramic composition among other factors."

At column 1, lines 36-43, Brezny states that "[f]or many catalyst support and biological support applications, it is generally desirable to have a ceramic with predominantly reticulate porosity to increase the surface area of the ceramic which is accessible to the medium surrounding the porous ceramic. Further, it is often desirable that the porous ceramic have combinations of micropores and reticulate macropores to allow greater access to the ceramic surface. Interconnected macropores facilitate the passage of fluid through the ceramic."

Thus, Brezny makes clear that ceramic beads are designed for specific purposes, and that porous ceramic beads having interconnected macropores to facilitate the passage of fluid therethrough are useful for catalyst support and biological support applications. These ceramic beads are not disclosed as being useful in the filtering of liquid metal, and it is not disclosed or suggested by Brezny what type of beads would be useful for this purpose. Thus, one of ordinary

skill in the art could not conclude from Brezny that beads with open porosity would be any more useful in filtering liquid metal than the beads already disclosed by Hess et al and Rieger et al. It is only Applicants who teach that the filtering of liquid metal can be improved by using refractory reticulate grains having an open porosity between 5 and 30%.

Withdrawal of this rejection is requested.

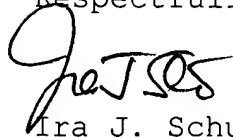
Claims 5, 7, 8 and 9 have been rejected over 35 USC 103 over Hess et al in view of Rieger et al and further in view of Neidhardt et al.

Neidhardt et al has been cited to show the preparation of electro-fused corundum, which is largely a corundum consisting of α -corundum and free of β -corundum. This reference does not teach the porosity of the product and does not disclose or suggest that a product with open porosity would enhance the filtration of liquid metal. Since neither Neidhardt et al nor Rieger et al discloses or suggests that refractory grains with open porosity would enhance the filtration of liquid metal as disclosed by Hess et al, Applicants submit that the claimed invention is patentable over the cited combination of references. Withdrawal of this rejection is requested.

In view of the foregoing remarks, Applicants submit that the present application is now in condition for allowance

and an early allowance of the application is earnestly solicited.

Respectfully submitted,



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